Quadratic Functions

Vertex form

$f(x)=a(x-h)^2 + k$

a= direction/stretch/compress

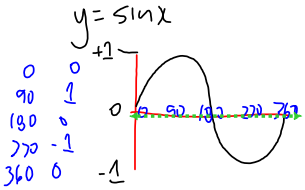
h= left or right

horizontal translation

k= up or down

vertical translation

Cycles - Sinusoidal Functions



Apr 22-9:00 AM

p359 6.5 Transformations

$f(x) = a \sin (x)$

$f(x) = a \sin (x-c)$

$f(x) = a \sin (x-c) + d$

$f(x) = a \sin (x-c) + d$

d = change → axis of symmetry up/ down

c = change left/right phase shift

a = stretch/compress and/or reflect (amplitude)

May 4-1:31 PM

Given $f(x) = \sin (x-c) + d$

c = phase shift

measured in degrees

- horizontal translation left or right

if $c > 0$, shift right

$c < 0$, shift left

d= vertical translation up or down

$d > 0$ shift up

$d < 0$ shift down

May 4-2:04 PM

Example

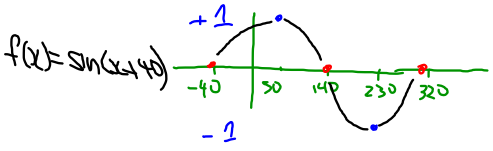
$f(x) = a \sin (x-c) + d$

a) $f(x) = \sin(x+40)$ $c = -40$

0	-1
90	0
180	1
270	0
360	-1

-40	0
50	1
140	0
230	-1
320	0

phase shift left 40°



Nov 25-9:53 AM

$f(x) = a \sin (x-c) + d$

$f(x) = \sin x + 8$

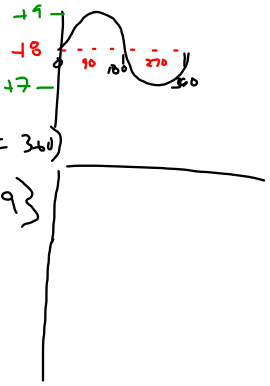
vertical translation

up 8

$D = \{x \in R \mid 0 \le x \le 360\}$

$R = \{f(x) \in R \mid 7 \le f(x) \le 9\}$

0	8
90	9
180	8
270	7
360	8



May 4-2:08 PM

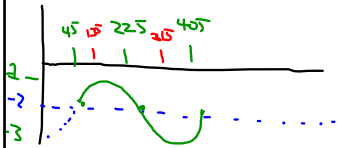
$f(x) = a \sin (x-c) + d$

$f(x) = \sin (x-45^\circ) - 2$

phase shift right 45°

shift down 2 units

45	-2
135	-1
225	-2
315	-3
405	-2



$D = \{x \in R \mid 45 \le x \le 405\}$

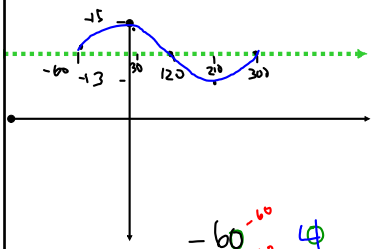
$R = \{f(x) \in R \mid -3 \le f(x) \le -1\}$

May 4-2:11 PM

Graph

$f(x) = a \sin (x-c) + d$

$f(x) = \sin(x+60) + 4$



0	0
90	1
180	0
270	-1
360	0

-60	4
30	5
120	4
210	3
300	4

Apr 22-10:16 AM

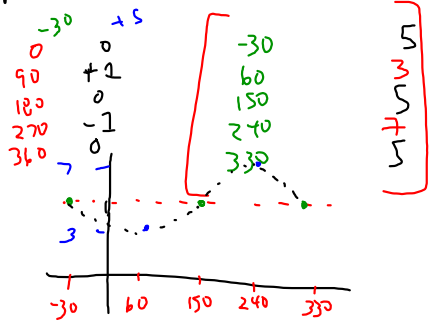
a) $f(x) = -2 \sin(x+30) + 5$

phase shift left 30°

shifted up 5

-ve reflected

amplitude = 2 stretched by 2



Nov 25-10:12 AM

$f(x) = a \sin (x-c) + d$

right 20°

up 5

$f(x) = \sin(x-20) + 5$

$D = \{x \in R\}$

$R = \{f(x) \in R \mid 4 \le f(x) \le 6\}$

Nov 25-10:19 AM

Example 3

$f(x) = a \sin(x-c) + d$

$f(x) = a \sin(x+90) + d$

$f(x) = \sin(x+90) + 1$

Nov 25-10:22 AM

Example 4

$f(x) = a \sin(x-c) + d$

$f(x) = -\sin(x-c) + d$ reflected

$f(x) = -\sin(x) + 4$ up 4 units

Example 5

$f(x) = a \sin(x-c) + d$

$f(x) = a \sin(x-c) - 1$ down 1 unit

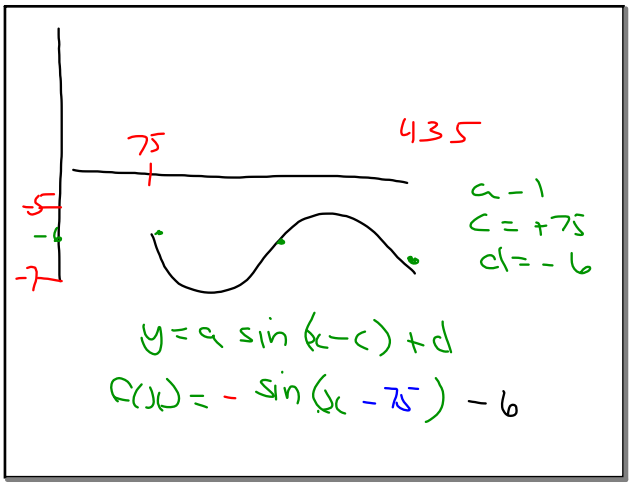
$f(x) = 2 \sin(x) - 1$ stretched by 2

Nov 25-10:25 AM

p 365-367

q 4-6, 10 & 15

May 4-2:18 PM



Nov 25-10:29 AM

Nov 11-10:37 AM